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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/800,512	03/08/2001	Takanobu Takeda	KOJIM-383	5073

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EXAMINER

LEE, SIN J

ART UNIT

PAPER NUMBER

1752

DATE MAILED: 07/05/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

HCP

**Office Action Summary**

Application No.

09/800,512

Applicant(s)

TAKEDA ET AL.

Examiner

Sin J Lee

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**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --****Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 08 March 2001.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-4 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All   b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

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### DETAILED ACTION

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(c) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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3. Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takechi et al (5,443,690) in view of Allen et al (5,962,184) and Aldrich's Catalog Handbook of Fine Chemicals 1996-1997 (published by Aldrich Chemical Co., Inc. in 1996).

Takechi et al teaches (see Example 5 in col.9 and col.12, lines 36-39) a chemical amplification resist material which is a *cyclohexanone* (an organic solvent) solution prepared by adding triphenylsulfonium antimonate (as a photoacid generator) to a terpolymer (*molecular weight of 9,200*) of vinylphenol-adamantyl methacrylate-tert-butyl methacrylate, which chemical structure is shown in col.9, lines 35-45. Takechi's terpolymer meets the limitations of the present polymer of formula (2) where the variable u is 0 (i.e., present second repeating unit of the formula (2) is not required to be present), R<sup>6</sup> is hydrogen, k is 1, R<sup>7</sup> is a methyl group, R<sup>10</sup> is a cyclic alkyl group of 10 carbon atoms, R<sup>8</sup> is a methyl group and R<sup>11</sup> is a tertiary alkyl group of 4 carbon atoms. Since Takechi's terpolymer does not include any other kind of repeating units, the prior art's terpolymer also satisfies the present limitation of  $t+u+v+w = 1$ . Therefore, Takechi teaches present polymer of formula (2) having a weight average molecular weight of 1,000 to 500,000, present organic solvent, and present photoacid generator.

Takechi fails to teach present polymer of the formula (1). Polyhydroxystyrene is well known in the art as a material that is added to a chemically amplified photoresist composition in order to adjust its dissolution rate as evidenced by Allen et al, col.4, lines 32-48. Since Allen also teaches a chemically amplified photoresist composition (which comprises a photoacid generator and a polymer made from a hydroxystyrene and a (meth)acrylate having an alicyclic

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ester substituent), it is the Examiner's position that it would have been obvious to one of ordinary skill in the art to add polyhydroxystyrene to Takechi's chemical amplification resist material in order to be able to adjust the dissolution rate of the resist material as taught by Allen et al.

Polyhydroxystyrene meets the limitations of present polymer of formula (1) where q, r, and s are 0, R<sup>1</sup> is hydrogen, x is 0, R is a hydroxyl group and y is 1. Allen does not disclose any molecular weight for the polyhydroxystyrene. However, commercially available polyhydroxystyrene is known to have Mw of *about 8,000* or *about 20,000* as evidenced by Aldrich's Catalog, pg.1242. Since both of these values fall within the present range of 1,000 to 500,000, Takechi in view of Allen and Aldrich's Catalog would render obvious present polymeric mixture of claim 1 and thus render obvious present inventions of claims 1 and 2.

4. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takechi et al (5,443,690) in view of Allen et al (5,962,184) as applied to claim 1 above, and further in view of Houlihan et al (5,843,624).

Takechi in view of Allen with respect to claim 1 is discussed above in Paragraph 3.

Takechi in view of Allen do not teach presently claimed dissolution regulator. However, it is well known in the art, as evidenced by Houlihan et al (col.3, lines 58-65, col.5, lines 48-52, lines 64-67, and col.6, lines 1-5), to add a dissolution inhibitor to a resist material containing a polymer already having acid labile groups pendant thereto. When one combines a dissolution inhibitor with a polymer already having acid labile groups pendant thereto (as in Takechi's terpolymer used in Example 5), the contrast between the portion of the resist material that is

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exposed to radiation and the unexposed portion is enhanced because the alkali solubility of both the polymer and the dissolution inhibitor is altered by the acid generated by the photoacid generator when the resist material is exposed to radiation and post-exposure baked. Therefore, based on Houlihan's teaching, it would have been obvious to one of ordinary skill in the art to additionally employ a dissolution inhibitor in Takechi et al's resist material in order to enhance the contrast between the exposed and unexposed portions of Takechi's resist material as taught by Houlihan et al. Therefore, Takechi et al in view of Allen et al and further in view of Houlihan would render obvious present invention of claim 3.

5. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takechi et al (5,443,690) in view of Allen et al (5,962,184) as applied to claim 2 above, and further in view of Okazaki et al (6,284,427 B1).

Takechi in view of Allen with respect to claim 2 is discussed above in Paragraph 3.

Takechi in view of Allen do not teach presently claimed basic compound of claim 4. However, it is very well known in the art, as evidenced by Okazaki (col.11, lines 29-35, col.1, lines 5-12), to add a base compound to a chemically amplified resist composition in order to prevent the deterioration of pattern characteristics even in the case where the treatment step is conducted with delay and also to obtain improvements in clear contrast. Based on Okazaki's teaching, it is the Examiner's position that it would have been obvious to one of ordinary skill in the art to add a basic compound to Takechi's chemical amplification resist material so as to prevent the deterioration of pattern characteristics even in the case where the treatment step is

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conducted with delay and also to obtain improvements in clear contrast as taught by Okazaki. Therefore, Takechi in view of Allen and further in view of Okazaki would render obvious present invention of claim 4.

6. Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takechi et al (5,443,690) in view of Kobayashi et al (6,342,542 B1) and Aldrich's Catalog Handbook of Fine Chemicals 1996-1997 (published by Aldrich Chemical Co., Inc. in 1996).

Takechi et al has been discussed in Paragraph 3.

As noted above in Paragraph 3, Takechi fails to teach present polymer of formula (1). Polyhydroxystyrene (which fits present formula (1)) is well known in the art as a material that is added to a photoresist composition (whether positive working or negative working) in order to aid the adhesion of the composition to a substrate as evidenced by Kobayashi et al, col.5, lines 36-41. Since Takechi clearly teaches a photoresist composition, it is the Examiner's position that it would have been obvious to one of ordinary skill in the art to add polyhydroxystyrene to Takechi's chemical amplification resist material in order to improve the adhesion of his resist material to the substrate as taught by Kobayashi. Polyhydroxystyrene meets the limitations of present polymer of formula (1) where q, r, and s are 0, R<sup>1</sup> is hydrogen, x is 0, R is a hydroxyl group and y is 1. Kobayashi does not disclose any molecular weight for the polyhydroxystyrene. However, commercially available polyhydroxystyrene is known to have Mw of *about 8,000* or *about 20,000* as evidenced by Aldrich's Catalog, pg.1242. Since both of these values fall within the present range of 1,000 to 500,000, Takechi in view of Kobayashi and Aldrich's Catalog

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would render obvious present polymeric mixture of claim 1 and thus render obvious present inventions of claims 1 and 2.

7. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takechi et al (5,443,690) in view of Kobayashi et al (6,342,542 B1) as applied to claim 1 above, and further in view of Houlihan et al (5,843,624).

Takechi in view of Kobayashi with respect to claim 1 is discussed above in Paragraph 6.

Takechi in view of Kobayashi do not teach presently claimed dissolution regulator.

However, it is well known in the art, as evidenced by Houlihan et al (col.3, lines 58-65, col.5, lines 48-52, lines 64-67, and col.6, lines 1-5), to add a dissolution inhibitor to a resist material containing a polymer already having acid labile groups pendant thereto. When one combines a dissolution inhibitor with a polymer already having acid labile groups pendant thereto (as in Takechi's terpolymer used in Example 5), the contrast between the portion of the resist material that is exposed to radiation and the unexposed portion is enhanced because the alkali solubility of both the polymer and the dissolution inhibitor is altered by the acid generated by the photoacid generator when the resist material is exposed to radiation and post-exposure baked. Therefore, based on Houlihan's teaching, it would have been obvious to one of ordinary skill in the art to additionally employ a dissolution inhibitor in Takechi et al's resist material in order to enhance the contrast between the exposed and unexposed portions of Takechi's resist material as taught by Houlihan et al. Therefore, Takechi et al in view of Kobayashi et al and further in view of Houlihan would render obvious present invention of claim 3.



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8. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takechi et al (5,443,690) in view of Kobayashi et al (6,342,542 B1) as applied to claim 2 above, and further in view of Okazaki et al (6,284,427 B1).

Takechi in view of Kobayashi with respect to claim 2 is discussed above in Paragraph 6.

Takechi in view of Kobayashi do not teach presently claimed basic compound of claim 4. However, it is very well known in the art, as evidenced by Okazaki (col.11, lines 29-35, col.1, lines 5-12), to add a base compound to a chemically amplified resist composition in order to prevent the deterioration of pattern characteristics even in the case where the treatment step is conducted with delay and also to obtain improvements in clear contrast. Based on Okazaki's teaching, it is the Examiner's position that it would have been obvious to one of ordinary skill in the art to add a basic compound to Takechi's chemical amplification resist material so as to prevent the deterioration of pattern characteristics even in the case where the treatment step is conducted with delay and also to obtain improvements in clear contrast as taught by Okazaki. Therefore, Takechi in view of Kobayashi and further in view of Okazaki would render obvious present invention of claim 4.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sin J. Lee whose telephone number is (703) 305-0504. The examiner can normally be reached on Monday-Friday from 8:30 am EST to 5:00 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ms. Janet Baxter, can be reached on (703) 308-2303. The fax phone number for the

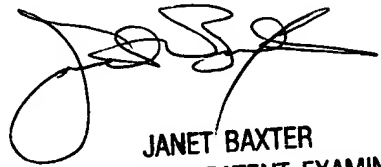
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organization where this application or proceeding is assigned is (703) 872-9311 for after final responses or (703) 872-9310 for before final responses.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-0661.

*S. Lee*

S. Lee  
July 1, 2002

  
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